

## The Yellingbo population of Leadbeater's Possum – remnant or introduced?

Dan Harley

Wildlife Ecology Research Group, School of Biological Sciences,  
PO Box 18, Monash University, Clayton, Vic. 3800, Australia.  
Current address: Department for Environment and Heritage, PO Box 1046,  
MI Gambier, South Australia 5290. Email: dkpharley@hotmail.com

### Abstract

In 1986 a small, outlying population of Leadbeater's Possum was discovered inhabiting lowland swamp forest at Yellingbo Nature Conservation Reserve. Given the pronounced differences between the vegetation community at this site and that throughout the possum's stronghold in the Victorian Central Highlands, some people have speculated that the species may have been introduced to Yellingbo. I list several reasons why this is unlikely to be the case. (*The Victorian Naturalist* 123 (3) 2006, 170-173)

In 1961, after 51 years without a confirmed sighting, Leadbeater's Possum *Gymnobelideus leadbeateri* was rediscovered in the montane ash forests of the Victorian Central Highlands (Wilkinson 1961). The discovery prompted a substantial amount of survey and ecological research during subsequent decades (e.g. Smith 1984a, 1984b; Smith *et al.* 1985; Lindenmayer *et al.* 1989, 1990, 1991a, 1991b; Smith and Lindenmayer 1992) which has ultimately resulted in a widely held belief that the species is something of a montane ash forest specialist (e.g. Loyn and McNabb 1982). Thus, in 1986, when a small, isolated population of Leadbeater's Possum was discovered in lowland swamp forest at Yellingbo Nature Conservation Reserve (Smales 1994), some people questioned the origin of the species at this site. It is a question that has been asked of me on numerous occasions during the decade over which I've been investigating the possum's ecology. Could Leadbeater's Possums originating from captivity or the Central Highlands have been released at Yellingbo? Below I list several reasons why this is unlikely to be the case.

- Very few people would have had access to Leadbeater's Possums for the purposes of release, as the species is notoriously difficult to trap in montane ash forest (Smith 1978, 1980). Whilst acquiring possums presents a major obstacle, it should be noted that the species is not particularly difficult to

keep and breed in captivity, and one person, Des Hackett, did so successfully at his private residence in Blackburn during the late 1970s and early 1980s (Myroniuk and Seebeck 1992). According to Myroniuk and Seebeck (1992), all of the Leadbeater's Possums held in captivity by Des Hackett were handed over to the Melbourne Zoo, Healesville Sanctuary and Taronga Zoo between January 1981 and September 1986.

- Given that Leadbeater's Possum was presumed extinct between 1920 and 1960, it is reasonable to assume that any release of possums at Yellingbo, if indeed such an event took place, probably occurred after 1961. However, the considerable focus on montane ash forest that followed the species' rediscovery in 1961 makes it unlikely that the lowland swamp forest at Yellingbo would have been regarded as a suitable release site for the species.
- For an individual or group of people to undertake such an initiative in complete secrecy and to show no subsequent interest in the population would seem highly unlikely.
- The size and distribution of the Yellingbo population, approximately 100 individuals distributed along a narrow, 6 km length of floodplain forest (Harley *et al.* 2005), is more indicative of a naturally occurring population than one that has been introduced. For a translocation to produce this distribu-

tion pattern it would probably require the release of substantial numbers of possums at multiple release sites. Most successful translocation projects require multiple release events conducted over several years.

- The success rate of mammal translocations and re-introductions is generally quite low (Griffith *et al.* 1989; Short *et al.* 1992; Beck *et al.* 1994; Pietsch 1994; Wolf *et al.* 1996; Fischer and Lindenmayer 2000). There have been just two attempts to translocate Leadbeater's Possums to date, one of which involved captive-bred individuals, and both were unsuccessful (Macfarlane and Seebeck 1991; Harley unpubl. data). However, the related Sugar Glider *Petaurus breviceps*, which is of a similar size to the possum and has similar dietary and denning requirements, has been successfully established at a number of new localities (Suckling and Macfarlane 1983; Suckling and Goldstraw 1989; Irvine and Bender 1997).
- The occurrence of Leadbeater's Possum in lowland swamp forest at Yellingbo is anomalous with all but one of the other records of the species collected since rediscovery of the species in 1961. However, Smales (1994) proposed that the possum's occurrence at Yellingbo is consistent with the historic records of the species (1867–1910) from the Bass River near the town of Woodleigh and Koo-Wee-Rup Swamp near Tynong (McCoy 1867; Brazenor 1946). Prior to the clearance of native vegetation at these sites, they are likely to have supported habitat similar to that present at Yellingbo today (Smales 1994). Indeed, during the late 1800s and early 1900s, the possum was thought to be restricted to these types of habitats (e.g. Spencer 1921; Anon 1939) and there had been no suggestion that it might also occur in montane forest.
- Leadbeater's Possum is extremely cryptic and its presence at a site can be easily overlooked. Thus, it is not altogether surprising that it was not detected at Yellingbo prior to 1986, and its discovery there at that time was entirely serendipitous (Smales 1994).

- In addition to Yellingbo, Leadbeater's Possum recently has been detected at one other site dominated by Mountain Swamp Gum *Eucalyptus camphora*, the Silver Gum Reserve near Buxton (K Garth, pers. comm.; pers. obs.). This small, 17 ha reserve is situated approximately 55 km north of Yellingbo, and sections of it bear considerable resemblance to the latter.

Speculation concerning the origin of the Yellingbo population of Leadbeater's Possums seems to have arisen because of the notable differences between the floristics and structure of montane ash forest in the Victorian Central Highlands and lowland swamp forest at Yellingbo (see Harley *et al.* 2005). For instance, the latter vegetation community lacks *Acacia* spp., which are one of the possum's major sources of food in montane ash forest (Smith 1984b). The likelihood of the possum's presence at a site is positively correlated with the basal area of *Acacia* spp. in montane ash forest (Lindenmayer *et al.* 1991a). Lindenmayer *et al.* (1993) detected the possum at only one of 49 linear corridors of montane ash forest that they surveyed. In contrast, the lowland swamp forest inhabited by Leadbeater's Possums at Yellingbo is a naturally occurring corridor, stretching along a narrow floodplain that rarely exceeds 120 m in width (Harley *et al.* 2005). Despite these notable differences, the two vegetation communities share several attributes likely to be of significance to the possum. These include: the predominance of smooth-barked eucalypts (given that one of the species' main feeding behaviours involves licking surface exudates from their trunks), hollow-bearing trees (that provide den sites) and highly-connected vegetation in either the midstorey or canopy (that facilitates the possums' mode of locomotion through the forest). In addition, both forest types are characterised by a cold, wet climate.

The nearest records of extant Leadbeater's Possum populations to Yellingbo are approximately 17 km to the east and north-east in montane ash forest at Mt Beenak and Ben Cairn (Owen 1963; Loyn and McNabb 1982; Lindenmayer *et al.* 1989). This distance is considerably greater than the species' dispersal capabili-

ty (the longest movement recorded for the species is approximately 1500 m; see Harley 2005), and this, coupled with habitat fragmentation during the last century, indicates that the Yellingbo population is isolated from those in the Victorian Central Highlands.

A molecular investigation into population differentiation in Leadbeater's Possum currently underway in the School of Biological Sciences at Monash University may be able to resolve the question surrounding the origin of the Yellingbo possums – remnant or introduced? Indeed, it offers the most likely source of hard evidence on the subject. If there has not been genetic interchange between lowland and montane populations for a significant period of time (e.g. centuries), then one would predict certain genetic differences to be apparent, leading to the conclusion that Yellingbo supports a remnant population. Conversely, the origin of the Yellingbo possums may be more difficult to establish using molecular techniques if there has been regular genetic interchange across the 17 km gap in the species' distribution within the last 100 years, as the genetic makeup of populations in the two areas may be similar.

While there is no doubt that the majority of extant Leadbeater's Possum populations inhabit montane ash forest, a recent survey of the species' distribution and abundance in sub-alpine woodland dominated by Snow Gum *Eucalyptus pauciflora* at Lake Mountain has revealed another significant population occurring outside montane ash forest (Jelinek *et al.* 1995; Harley, unpubl. data). It is likely that the extensive Snow Gum woodlands of the Mt Baw Baw/Mt Erica plateau also support a substantial Leadbeater's Possum population (Atlas of Victorian Wildlife Database). Such results are not entirely surprising, as the other three species of petaurid that occur in temperate south-eastern Australia (the Sugar Glider, Squirrel Glider *Petaurus norfolcensis* and Yellow-bellied Glider *Petaurus australis*), which occupy the same feeding niche as Leadbeater's Possum, are each found in a range of forest types.

In conclusion, there appear to be several reasons why the theory that Leadbeater's Possums were introduced to Yellingbo is

unlikely, and no reasons in support of it other than that the forest at Yellingbo differs from montane ash forest. I suggest that the likelihood that the species was introduced to Yellingbo is extremely low, and that the site almost certainly supports a remnant Leadbeater's Possum population. Moreover, the speculation concerning the origin of the Yellingbo population appears to have arisen without recognition of the similarities that lowland swamp forest has with the vegetation communities present at the historic collection localities for the species.

## References

- Anon (1939) Too clever to live. Animals that specialised - and died. *Wild Life* 1, 9-10.
- Beck BB, Rapaport LG, Stanley Price MR and Wilson AC (1994) Reintroduction of captive-born animals. In *Creative Conservation: Interactive management of wild and captive animals*, pp. 265-286. Eds PJS Olney, GM Mace and ATC Feisner. (Chapman and Hall: London)
- Brazenor CW (1946) Last chapter to come. A history of Victoria's rarest possum. *Wild Life* 8, 382-384.
- Fischer J and Lindenmayer DB (2000) An assessment of the published results of animal relocations. *Biological Conservation* 96, 1-11.
- Griffith B, Scott LM, Carpenter JW and Reed C (1989) Translocation as a Species Conservation Tool: Status and Strategy. *Science* 245, 477-480.
- Harley DKP (2004) A review of recent records of Leadbeater's Possum (*Gymnobelideus leadbeateri*). In *The Biology of Australian Possums and Gliding Possums*, pp. 330-338. Eds R Goldingay and S Jackson. (Surrey Beatty and Sons: Sydney)
- Harley DKP (2005) The life history and conservation of Leadbeater's Possum (*Gymnobelideus leadbeateri*) in lowland swamp forest. (Unpublished Ph.D. Thesis, Monash University, Melbourne)
- Harley DKP, Worley MA, and Harley TK (2005) The distribution and abundance of Leadbeater's Possum *Gymnobelideus leadbeateri* in lowland swamp forest at Yellingbo Nature Conservation Reserve. *Australian Mammalogy* 27, 7-15.
- Irvine R, and Bender R (1997) Introduction of the Sugar Glider *Petaurus breviceps* into re-established forest of the Organ Pipes National Park, Victoria. *The Victorian Naturalist* 114, 230-239.
- Jelinek A, Cameron D, Belcher C and Turner I (1995) New perspectives on the ecology of Lake Mountain: The discovery of Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy in sub-alpine woodland. *The Victorian Naturalist* 112, 112-115.
- Lindenmayer DB, Smith AP, Craig SA and Lumsden LF (1989) A survey of the distribution of Leadbeater's Possum, *Gymnobelideus leadbeateri* McCoy in the central highlands of Victoria. *The Victorian Naturalist* 106, 174-178.
- Lindenmayer DB, Cunningham RB, Tanton MT and Smith AP (1990) The conservation of arboreal marsupials in the montane ash forests of the central highlands of Victoria, south-east Australia: II. The loss of trees with hollows and its implications for the conservation of Leadbeater's Possum *Gymnobelideus leadbeateri* McCoy (Marsupialia: Petauridae). *Biological Conservation* 54, 133-145.
- Lindenmayer DB, Cunningham RB, Tanton MT, Nix

- HA and Smith AP (1991a) The conservation of arboreal marsupials in the montane ash forests of the central highlands of Victoria, south-east Australia: III. The habitat requirements of Leadbeater's Possum *Gymnobelideus leadbeateri* and models of the diversity and abundance of arboreal marsupials. *Biological Conservation* **56**, 295-315.
- Lindenmayer DB, Cunningham RB, Tanton MT, Smith AP and Nix IJA (1991b) Characteristics of hollow-bearing trees occupied by arboreal marsupials in the montane ash forests of the central highlands of Victoria, south-east Australia. *Forest Ecology and Management* **40**, 289-308.
- Lindenmayer DB, Cunningham RB and Donnelly CF (1993) The conservation of arboreal marsupials in the montane ash forests of the central highlands of Victoria, south-east Australia: IV. The presence and abundance of arboreal marsupials in retained linear habitats (wildlife corridors) within logged forest. *Biological Conservation* **66**, 207-221.
- Loyn RII and McNabb EG (1982) Discovery of Leadbeater's Possum in Gembrook State Forest. *The Victorian Naturalist* **99**, 21-23.
- MacFarlane MA, and Seebeck JH (1991) Draft Management Strategies for the Conservation of Leadbeater's Possum. *Gymnobelideus leadbeateri*, in Victoria. Arthur Rylah Institute Technical Report Series III, Department of Conservation and Environment, Victoria.
- McCoy F (1867) On a new genus of phalanger. *Annals and Magazine of Natural History* **3**, 287-288.
- Myroniuk PO and Seebeck JH (1992) *In situ* and *ex situ* conservation of Leadbeater's possum *Gymnobelideus leadbeateri*. *International Zoo Yearbook* **31**, 82-90.
- Owen WH (1963) Further sight records of Leadbeater's Possum. *The Victorian Naturalist* **79**, 292-293.
- Pietsch RS (1994) The fate of urban Common Brushtail Possums translocated to sclerophyll forest. In *Reintroduction Biology of Australian and New Zealand Fauna*, pp. 239-246. Ed M Serena. (Surrey Beatty & Sons: Chipping Norton NSW)
- Short J, Bradshaw SD, Giles J, Prince RIT and Wilson GR (1992) Reintroduction of macropods (Marsupialia: Macropodoidea) in Australia — A review. *Biological Conservation* **62**, 189-204.
- Smales IJ (1994) The discovery of Leadbeater's Possum, *Gymnobelideus leadbeateri* McCoy, resident in lowland swamp woodland. *The Victorian Naturalist* **111**, 178-182.
- Smith A (1978) On the trail of the rare Leadbeater's Possum. *Habitat* **6**, 3-5.
- Smith A (1980) The diet and ecology of Leadbeater's possum and the sugar glider. (Unpublished PhD Thesis, Monash University, Melbourne)
- Smith A (1984a) Demographic consequences of reproduction, dispersal and social interaction in a population of Leadbeater's Possum (*Gymnobelideus leadbeateri*). In *Possum and Gliders*, pp. 359-373. Eds AP Smith and JD Hume. (Australian Mammal Society: Sydney.)
- Smith A (1984b) Diet of Leadbeaters Possum, *Gymnobelideus leadbeateri* (Marsupialia). *Australian Wildlife Research* **11**, 265-273.
- Smith A, Lindenmayer D and Suckling G (1985) The Ecology and Management of Leadbeater's Possum. Research Report to the World Wildlife Fund Australia. University of New England, Armidale, NSW.
- Smith AP and Lindenmayer DB (1992) Forest succession and habitat management for Leadbeater's possum in the State of Victoria, Australia. *Forest Ecology and Management* **49**, 311-332.
- Spencer B (1921) The necessity for an immediate and coordinated investigation into the land and freshwater fauna of Australia and Tasmania. *The Victorian Naturalist* **37**, 120-122.
- Suckling GC and Macfarlane MA (1983) Introduction of the Sugar Glider, *Petaurus breviceps*, into re-established forest of the Tower Hill State Game Reserve, Vic. *Australian Wildlife Research* **10**, 249-258.
- Suckling GC and Goldstraw P (1989) Progress of Sugar Glider, *Petaurus breviceps*, establishment at the Tower Hill State Game Reserve. *The Victorian Naturalist* **106**, 179-183.
- Wilkinson HE (1961) The rediscovery of Leadbeater's Possum, *Gymnobelideus leadbeateri* McCoy. *The Victorian Naturalist* **78**, 97-102.
- Wolf CM, Griffith B, Reed C and Temple SA (1996) Avian and Mammalian Translocations: Update and Reanalysis of 1987 Survey Data. *Conservation Biology* **10**, 1142-1154.

Received 10 November 2005; accepted 16 February 2006

### One hundred years ago

WALLABY AT SEA – Mr. F. Wisewould stated that when coming from San Remo recently he noticed an object in Western Port Bay, about 100 yards from the beach, which proved to be a wallaby swimming towards Phillip Island. It seemed very exhausted, and fell down upon reaching the shore, taking several minutes to reach the scrub, only a short distance off. It is alleged there are no wallabies on either French or Phillip Island. Should this be correct, the animal must have been caught by the tide on one of the mud banks or sand spits at the head of the bay, and carried by the ebb, which was running very fast, a distance of eight or ten miles.

From *The Victorian Naturalist* XXII (12) p. 224